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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 03/08/2005

Application Number: 09/851,242
Filing Date: May 08, 2001
Appellant(s): RUNKLE ET AL.

Robert H. Hammer III
For Appellant

SUPPLEMENTAL EXAMINER'S ANSWER

This is in response to the appeal brief filed January 30, 2004 and the remand mailed January 27, 2005.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

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(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences that will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The amendment after final rejection filed on January 9, 2004 has been entered. Claims 20 and 28 have been canceled.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

The rejection of claims 1-2, 4-5 and 21-27 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5,186,832	MANCUSI et al.	02-1993
4,800,019	BIKSON et al.	01-1989
5,284,584	HUANG et al.	02-1994
4,961,760	CASKEY et al.	10-1990

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

A. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

B. Claims 1-2, 4-5 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mancusi *et al.* (US Patent No. 5,186,832) in view of Bikson *et al.* (US Patent No. 4,800,019).

Mancusi *et al.* ('832) teach the basic claimed process of making a hollow fiber membrane separation device (contactor) including, providing a core, wrapping a hollow fiber fabric onto said core (winding), potting the fabric and the core together to form an assembly (first potting), placing the assembly in a housing (shell) and potting the assembly and the housing interior to form a cartridge (second potting) (see col. 8, lines 44-48, col. 9, lines 1-7 and 60-68 and col. 9, lines 41-60). Further, it should be noted that Mancusi *et al.* ('832) specifically teach potting of the tube-sheets to the interior of the housing (see col. 9, lines 22-27). Furthermore, Mancusi *et al.*

('832) teach that the potting between the fabric and the core occurs by putting down continuous resinous potting material lines (bead-potting) (see col. 10, lines 45-50).

Regarding claims 1 and 20, although Mancusi *et al.* ('832) teach a second potting step, Mancusi *et al.* ('832) do not specifically teach mold potting. Bikson *et al.* ('019) teach a process for forming a hollow fiber membrane contactor cartridge including, providing a mold, inserting the ends of a plurality of hollow fiber (3) bundles into the mold and injecting a resinous material into the mold to form tube-sheets (1) that are integral with the housing (see col. 4, lines 48-68). Therefore, it would have been obvious for one of ordinary skill in the art to have used mold potting as an alternative to gravity or centrifugal potting as taught by Bikson *et al.* ('019) in the process of Mancusi *et al.* ('832) because, Bikson *et al.* ('019) teach that mold potting is one of many equivalent procedures available to one ordinarily skilled in the art and also because, both references teach similar products and processes and solve the similar problem of potting in a process of making a hollow fiber membrane separation device (contactor). It is submitted that a space must exist between the exterior of the fiber bundles and, the mold and the housing, in order for the resin to penetrate between said spaces, such that mold potting occurs as described in the process of Mancusi *et al.* ('832) in view of Bikson *et al.* ('019).

In regard to claim 2, Mancusi *et al.* ('832) teach that the potting between the fabric and the core occurs by putting down continuous resinous potting material lines (bead-potting) (see col. 10, lines 45-50).

Specifically regarding claims 4 and 5, Mancusi *et al.* ('832) does not teach a step of heat-treatment, specifically a first and a second heat-treatment. Bikson *et al.* ('019) teach a process for forming a hollow fiber membrane contactor including, a first step of heat-treating to cure the potting resin and then a second step of heat treatment (see col. 4, line 60 through col. 5, line 7). Therefore, it would have been obvious for one of ordinary skill in the art to have heat-treated the hollow fiber membrane contactor as taught by Bikson *et al.* ('019) in the process of Mancusi *et al.* ('832) because, Bikson *et al.* ('019) specifically teach that a two-step heat treatment process provides for an increased density of the porous walls of the hollow fibers, hence providing for an improved product (see col. 3, lines 27-42) also because, both references teach similar end-products.

Regarding claim 19, Mancusi *et al.* ('832) specifically teach a hollow fiber membrane separation device (contactor). It is submitted that the assembly (structure) is centered in the housing (shell) in order for the resulting hollow fiber membrane separation device (contactor) to function as described.

C. Claims 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mancusi *et al.* (US Patent No. 5,186,832) in view of Bikson *et al.* (US Patent No. 4,800,019) and in further view of Caskey *et al.* (US Patent No. 4,961,760).

Mancusi *et al.* ('832) in view of Bikson *et al.* ('019) teach the basic claimed process as described above.

Regarding claims 16-18, although Mancusi *et al.* ('832) teach "resinous potting materials" (see col. 9, lines 10-12), Mancusi *et al.* in view of ('832) Bikson *et al.* ('019) do not

teach specific materials. Caskey *et al.* ('760) teach a process for making a hollow fiber membrane separation device (contactor) including, using a variety of materials as potting materials such as: epoxy (thermoset), polyurethane (thermoset and thermoplastic versions) and acrylic resins (thermoplastic). Therefore, it would have been obvious for one of ordinary skill in the art to have used a variety of potting materials such as, epoxy (thermoset), polyurethane (thermoset and thermoplastic versions) and acrylic resins (thermoplastic) as taught by Caskey *et al.* ('760) in the process of Mancusi *et al.* ('832) in view of Bikson *et al.* ('019) because, Mancusi *et al.* ('832) specifically requires "resinous potting materials" (see col. 9, lines 10-12) and also because all references teach a hollow fiber membrane separation device (contactor), hence a similar end-product.

D. Claims 1-2, 4-5, 16, and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang *et al.* (US Patent No. 5,284,584) in view of Mancusi *et al.* (US Patent No. 5,186,832) and in further view of Bikson *et al.* (US Patent No. 4,800,019).

Huang *et al.* ('584) teach the basic claimed process for making a hollow fiber membrane separation device (contactor) including, providing a core, wrapping a hollow fiber fabric onto said core and potting the fabric and the core together to form an assembly (see col. 15, line 57 through col. 16, line 26). Further, Huang *et al.* ('584) teach bead-potting (see Figure 1).

Regarding claim 1, Huang *et al.* ('584) do not teach forming a cartridge. Mancusi *et al.* ('832) teach a process for making a hollow fiber membrane separation device (contactor) including, providing a core, wrapping a hollow fiber fabric onto said core, potting the fabric and the core together to form an assembly, placing the assembly in a housing (shell) and potting the

assembly and the housing interior to form a cartridge (see col. 8, lines 44-48, col. 9, lines 1-7 and 60-68 and col. 9, lines 41-60). Further, it should be noted that Mancusi *et al.* ('832) specifically teach potting of the tubesheets to the interior of the housing (see col. 9, lines 22-27). Furthermore, Mancusi *et al.* ('832) teach that the potting between the fabric and the core occurs by putting down continuous resinous potting material lines (bead-potting) (see col. 10, lines 45-50). Therefore, it would have been obvious for one of ordinary skill to have inserted a hollow fiber membrane device into a casing and potted said hollow fiber membrane device to said casing as taught by Mancusi *et al.* ('832) in the process of Huang *et al.* ('584) because, Huang *et al.* ('584) specifically teach a hollow fiber membrane fabric used in separation devices, whereas Mancusi *et al.* ('832) teach a hollow fiber membrane separation devices and as such, the hollow fiber membrane fabric of Huang *et al.* ('584) requires to be inserted into a casing and potted to said casing as taught by Mancusi *et al.* ('832) in order to function as described.

Further regarding claim 1 and in regard to claim 20, although Mancusi *et al.* ('832) teach a second potting step, Huang *et al.* ('584) in view of Mancusi *et al.* ('832) do not specifically teach mold potting. Bikson *et al.* ('019) teach a process for forming a hollow fiber membrane contactor cartridge including, providing a mold, inserting the ends of a plurality of hollow fiber (3) bundles into the mold and injecting a resinous material into the mold to form tube-sheets (1) that are integral with the housing (see col. 4, lines 48-68). Therefore, it would have been obvious for one of ordinary skill in the art to have used mold potting as an alternative to gravity or centrifugal potting as taught by Bikson *et al.* ('019) in the process of Huang *et al.* ('584) in view of Mancusi *et al.* ('832) because, Bikson *et al.* ('019) teach that mold potting is one of many

equivalent procedures available to one ordinarily skilled in the art and also because, all references teach similar products and processes and solve the similar problem of potting in a process of making a hollow fiber membrane separation device (contactor). It is submitted that a space must exist between exterior of the fiber bundles and, the mold and the housing, in order for the resin to penetrate between said space, such that mold potting occurs as described in the process of Huang *et al.* ('584) in view of Mancusi *et al.* ('832) and in further view of Bikson *et al.* ('019).

In regard to claim 2, Huang *et al.* ('584) teach bead-potting (see Figure 1). Mancusi *et al.* ('832) teach that the potting between the fabric and the core occurs by putting down continuous resinous potting material lines (bead-potting) (see col. 10, lines 45-50).

Specifically regarding claims 4 and 5, Bikson *et al.* ('019) teach a process for forming a hollow fiber membrane contactor including, a first step of heat-treating to cure the potting resin and then a second step of heat treatment (see col. 4, line 60 through col. 5, line 7). Therefore, it would have been obvious for one of ordinary skill in the art to have heat-treated the hollow fiber membrane contactor as taught by Bikson *et al.* ('019) in the process of Huang *et al.* ('584) in view of Mancusi *et al.* ('832) because, Bikson *et al.* ('019) specifically teach that a two-step heat treatment process provides for an increased density of the porous walls of the hollow fibers, hence providing for an improved product (see col. 3, lines 27-42) also because, both references teach similar end-products.

Regarding claims 16 and 18, Huang *et al.* ('584) teach a thermoplastic polyolefin as a potting material (see col. 11, lines 32-47).

In regard to claim 19, Huang *et al.* ('584) specifically teach a hollow fiber membrane fabric used in separation devices, whereas Mancusi *et al.* ('832) teaches hollow fiber membrane separation devices. It is submitted that the assembly (structure) is centered in the housing (shell) in order for the resulting hollow fiber membrane separation device (contactor) to function as described in the process of Huang *et al.* ('584) in view of Mancusi *et al.* ('832) and in further view of Bikson *et al.* ('019).

E. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huang *et al.* (US Patent No. 5,284,584) in view of Mancusi *et al.* (US Patent No. 5,186,832) and in further view of Bikson *et al.* (US Patent No. 4,800,019) and Caskey *et al.* (US Patent No. 4,961,760).

Huang *et al.* ('584) in view of Mancusi *et al.* ('832) and in further view of Bikson *et al.* ('019) teaches the basic claimed process as described above.

Regarding claim 17, Huang *et al.* ('584) in view of Mancusi *et al.* ('832) and in further view of Bikson *et al.* ('019) do not teach an epoxy or a polyurethane potting material. Caskey *et al.* ('760) teach a process for making a hollow fiber membrane separation device (contactor) including, using a variety of equivalent materials as potting materials such as: epoxy (thermoset), polyurethane (thermoset and thermoplastic versions) and acrylic resins (thermoplastic). Therefore, it would have been obvious for one of ordinary skill in the art to have used a variety of equivalent potting materials such as, epoxy (thermoset), polyurethane (thermoset and thermoplastic versions) and acrylic resins (thermoplastic) as taught by Caskey *et al.* ('760) in the

process of Huang *et al.* ('584) in view of Mancusi *et al.* ('832) and in further view of Bikson *et al.* ('019) because, Mancusi *et al.* ('832) specifically requires "resinous potting materials" (see col. 9, lines 10-12) that are equivalent alternatives such as, epoxy (thermoset), polyurethane (thermoset and thermoplastic versions) and acrylic resins (thermoplastic) and also because all references teach a hollow fiber membrane separation device (contactor), hence a similar end-product.

F. Claims 21-23 and 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mancusi *et al.* (US Patent No. 5,186,832) in view of Bikson *et al.* (US Patent No. 4,800,019) and in further view of Applicants' Admitted Prior Art.

Mancusi *et al.* ('832) teach the basic claimed process of making a hollow fiber membrane separation device (contactor) including, providing a core, wrapping a hollow fiber fabric onto said core (winding), potting the fabric and the core together to form an assembly (first potting), placing the assembly in a housing (shell) and potting the assembly and the housing interior to form a cartridge (second potting) (see col. 8, lines 44-48, col. 9, lines 1-7 and 60-68 and col. 9, lines 41-60). Further, it should be noted that Mancusi *et al.* ('832) specifically teach potting of the tube-sheets to the interior of the housing (see col. 9, lines 22-27). Furthermore, Mancusi *et al.* ('832) teach that the potting between the fabric and the core occurs by putting down continuous resinous potting material lines (bead-potting) (see col. 10, lines 45-50).

Regarding claims 21 and 28, although Mancusi *et al.* ('832) teach a second potting step, Mancusi *et al.* ('832) do not specifically teach mold potting. Bikson *et al.* ('019) teach a process for forming a hollow fiber membrane contactor cartridge including, providing a mold, inserting

the ends of a plurality of hollow fiber (3) bundles into the mold and injecting a resinous material into the mold to form tube-sheets (1) that are integral with the housing (see col. 4, lines 48-68). Therefore, it would have been obvious for one of ordinary skill in the art to have used mold potting as an alternative to gravity or centrifugal potting as taught by Bikson *et al.* ('019) in the process of Mancusi *et al.* ('832) because, Bikson *et al.* ('019) teach that mold potting is one of many equivalent procedures available to one ordinarily skilled in the art and also because, both references teach similar products and processes and solve the similar problem of potting in a process of making a hollow fiber membrane separation device (contactor). It is submitted that a space must exist between exterior of the fiber bundles and, the mold and the housing, in order for the resin to penetrate between said spaces such that mold potting occurs as described in the process of Mancusi *et al.* ('832) in view of Bikson *et al.* ('019).

Further regarding claims 21 and 28, Mancusi *et al.* ('832) in view of Bikson *et al.* ('019) do not teach a hollow fiber membrane having a diameter of at least 6 inches. However, Applicants' Admitted Prior Art teaches a hollow fiber membrane having a diameter of about 10 inches (see page 2, line 9 of the original disclosure). Therefore, it would have been obvious for one of ordinary skill in the art to have formed a hollow fiber membrane having a diameter of about 10 inches by using a center tube having a diameter of about 10 inches as taught by Applicants' Admitted Prior Art using the process of Mancusi *et al.* ('832) in view of Bikson *et al.* ('019) because, Applicants' Admitted Prior Art specifically teaches that such hollow fiber membrane are readily available whereas both Mancusi *et al.* ('832) and Bikson *et al.* ('019) teach a hollow fiber membrane separation device (contactor), hence a similar end-product.

Specifically regarding claims 22 and 23, Mancusi *et al.* ('832) in view of Applicants' Admitted Prior Art does not teach a step of heat-treatment, specifically a first and a second heat-treatment. Bikson *et al.* ('019) teach a process for forming a hollow fiber membrane contactor including, a first step of heat-treating to cure the potting resin and then a second step of heat treatment (see col. 4, line 60 through col. 5, line 7). Therefore, it would have been obvious for one of ordinary skill in the art to have heat-treated the hollow fiber membrane contactor as taught by Bikson *et al.* ('019) in the process of Mancusi *et al.* ('832) in view of Applicants' Admitted Prior Art because, Bikson *et al.* ('019) specifically teach that a two-step heat treatment process provides for an increased density of the porous walls of the hollow fibers, hence providing for an improved product (see col. 3, lines 27-42) also because, all references teach similar end-products.

Regarding claim 27, Mancusi *et al.* ('832) specifically teach a hollow fiber membrane separation device (contactor). It is submitted that the assembly (structure) is centered in the housing (shell) in order for the resulting hollow fiber membrane separation device (contactor) to function as described.

G. Claims 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mancusi *et al.* (US Patent No. 5,186,832) in view of Bikson *et al.* (US Patent No. 4,800,019) and in further view of Applicants' Admitted Prior Art and Caskey *et al.* (US Patent No. 4,961,760).

Mancusi *et al.* ('832) in view of Bikson *et al.* ('019) in further view of Applicants' Admitted Prior Art teach the basic claimed process as described above.

Regarding claims 24-26, although Mancusi *et al.* ('832) teach "resinous potting materials" (see col. 9, lines 10-12), Mancusi *et al.* ('832) in view of Bikson *et al.* ('019) in further view of Applicants' Admitted Prior Art do not teach specific materials. Caskey *et al.* ('760) teach a process for making a hollow fiber membrane separation device (contactor) including, using a variety of materials as potting materials such as: epoxy (thermoset), polyurethane (thermoset and thermoplastic versions) and acrylic resins (thermoplastic). Therefore, it would have been obvious for one of ordinary skill in the art to have used a variety of potting materials such as, epoxy (thermoset), polyurethane (thermoset and thermoplastic versions) and acrylic resins (thermoplastic) as taught by Caskey *et al.* ('760) in the process of Mancusi *et al.* ('832) in view of Bikson *et al.* ('019) in further view of Applicants' Admitted Prior Art because, Mancusi *et al.* ('832) specifically requires "resinous potting materials" (see col. 9, lines 10-12) that are equivalent alternatives such as, epoxy (thermoset), polyurethane (thermoset and thermoplastic versions) and acrylic resins (thermoplastic) and also because all references teach a hollow fiber membrane separation device (contactor), hence a similar end-product.

H. Claims 21-24 and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang *et al.* (US Patent No. 5,284,584) in view of Mancusi *et al.* (US Patent No. 5,186,832) and in further view of Bikson *et al.* (US Patent No. 4,800,019) and Applicants' Admitted Prior Art.

Huang *et al.* ('584) teach the basic claimed process for making a hollow fiber membrane separation device (contactor) including, providing a core, wrapping a hollow fiber fabric onto

said core and potting the fabric and the core together to form an assembly (see col. 15, line 57 through col. 16, line 26). Further, Huang *et al.* ('584) teach bead-potting (see Figure 1).

Regarding claim 21, Huang *et al.* ('584) do not teach forming a cartridge. Mancusi *et al.* ('832) teach a process for making a hollow fiber membrane separation device (contactor) including, providing a core, wrapping a hollow fiber fabric onto said core, potting the fabric and the core together to form an assembly, placing the assembly in a housing (shell) and potting the assembly and the housing interior to form a cartridge (see col. 8, lines 44-48, col. 9, lines 1-7 and 60-68 and col. 9, lines 41-60). Further, it should be noted that Mancusi *et al.* ('832) specifically teach potting of the tubesheets to the interior of the housing (see col. 9, lines 22-27). Furthermore, Mancusi *et al.* ('832) teach that the potting between the fabric and the core occurs by putting down continuous resinous potting material lines (bead-potting) (see col. 10, lines 45-50). Therefore, it would have been obvious for one of ordinary skill to have inserted a hollow fiber membrane device into a casing and potted said hollow fiber membrane device to said casing as taught by Mancusi *et al.* ('832) in the process of Huang *et al.* ('584) because, Huang *et al.* ('584) specifically teach a hollow fiber membrane fabric used in separation devices, whereas Mancusi *et al.* ('832) teach hollow fiber membrane separation devices and as such, the hollow fiber membrane fabric of Huang *et al.* ('584) requires to be inserted into a casing and potted to said casing as taught by Mancusi *et al.* ('832) in order to function as described.

Further regarding claim 21 and in regard to claim 28, although Mancusi *et al.* ('832) teach a second potting step, Huang *et al.* ('584) in view of Mancusi *et al.* ('832) do not specifically teach mold potting. Bikson *et al.* ('019) teach a process for forming a hollow fiber

membrane contactor cartridge including, providing a mold, inserting the ends of a plurality of hollow fiber (3) bundles into the mold and injecting a resinous material into the mold to form tube-sheets (1) that are integral with the housing (see col. 4, lines 48-68). Therefore, it would have been obvious for one of ordinary skill in the art to have used mold potting as an alternative to gravity or centrifugal potting as taught by Bikson *et al.* ('019) in the process of Huang *et al.* ('584) in view of Mancusi *et al.* ('832) because, Bikson *et al.* ('019) teach that mold potting is one of many equivalent procedures available to one ordinarily skilled in the art and also because, all references teach similar products and processes and solve the similar problem of potting in a process of making a hollow fiber membrane separation device (contactor). It is submitted that a space must exist between exterior of the fiber bundles and, the mold and the housing, in order for the resin to penetrate between said space such that mold potting occurs as described in the process of Huang *et al.* ('584) in view of Mancusi *et al.* ('832) and in further view of Bikson *et al.* ('019).

Further regarding claims 21 and 28, Huang *et al.* ('584) in view of Mancusi *et al.* ('832) and in further view of Bikson *et al.* ('019) do not teach a hollow fiber membrane having a diameter of at least 6 inches. However, Applicants' Admitted Prior Art teaches a hollow fiber membrane having a diameter of about 10 inches (see page 2, line 9 of the original disclosure). Therefore, it would have been obvious for one of ordinary skill in the art to have formed a hollow fiber membrane having a diameter of about 10 inches by using a center tube having a diameter of about 10 inches as taught by Applicants' Admitted Prior Art using the process of Huang *et al.* ('584) in view of Mancusi *et al.* ('832) and in further view of Bikson *et al.* ('019)

because, Applicants' Admitted Prior Art specifically teaches that such hollow fiber membrane are readily available whereas Huang *et al.* ('584), Mancusi *et al.* ('832) and Bikson *et al.* ('019) teach a hollow fiber membrane separation device (contactor), hence a similar end-product.

In regard to claims 22-23, Bikson *et al.* ('019) teach a process for forming a hollow fiber membrane contactor including, a first step of heat-treating to cure the potting resin and then a second step of heat treatment (see col. 4, line 60 through col. 5, line 7). Therefore, it would have been obvious for one of ordinary skill in the art to have heat-treated the hollow fiber membrane contactor as taught by Bikson *et al.* ('019) in the process of Huang *et al.* ('584) in view of Mancusi *et al.* ('832) and in further view of Applicants' Admitted Prior Art because, Bikson *et al.* ('019) specifically teach that a two-step heat treatment process provides for an increased density of the porous walls of the hollow fibers, hence providing for an improved product (see col. 3, lines 27-42) also because, both references teach similar end-products.

Regarding claims 24 and 26, Huang *et al.* ('584) teach a thermoplastic polyolefin as a potting material (see col. 11, lines 32-47).

In regard to claim 27, Huang *et al.* ('584) specifically teach a hollow fiber membrane fabric used in separation devices, whereas Mancusi *et al.* ('832) teaches hollow fiber membrane separation devices. It is submitted that the assembly (structure) is centered in the housing (shell) in order for the resulting hollow fiber membrane separation device (contactor) to function as described in the process of Huang *et al.* ('584) in view of Mancusi *et al.* ('832) and in further view of Bikson *et al.* ('019) and Applicants' Admitted Prior Art.

I. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huang *et al.* (US Patent No. 5,284,584) in view of Mancusi *et al.* (US Patent No. 5,186,832) and in further view of Bikson *et al.* (US Patent No. 4,800,019), Applicants' Admitted Prior Art and Caskey *et al.* (US Patent No. 4,961,760).

Huang *et al.* ('584) in view of Mancusi *et al.* ('832) and in further view of Bikson *et al.* ('019) and Applicants' Admitted Prior Art teach the basic claimed process as described above.

Regarding claim 25, Huang *et al.* ('584) in view of Mancusi *et al.* ('832) and in further view of Bikson *et al.* ('019) and Applicants' Admitted Prior Art do not teach an epoxy or a polyurethane potting material. Caskey *et al.* ('760) teach a process for making a hollow fiber membrane separation device (contactor) including, using a variety of materials as potting materials such as: epoxy (thermoset), polyurethane (thermoset and thermoplastic versions) and acrylic resins (thermoplastic). Therefore, it would have been obvious for one of ordinary skill in the art to have used a variety of potting materials such as, epoxy (thermoset), polyurethane (thermoset and thermoplastic versions) and acrylic resins (thermoplastic) as taught by Caskey *et al.* ('760) in the process of Huang *et al.* ('584) in view of Mancusi *et al.* ('832) and in further view of Bikson *et al.* ('019) and Applicants' Admitted Prior Art because, Huang *et al.* ('584) specifically requires "resinous potting materials" that are equivalent alternatives such as, epoxy (thermoset), polyurethane (thermoset and thermoplastic versions) and acrylic resins (thermoplastic) and also because all references teach a hollow fiber membrane separation device (contactor), hence a similar end-product.

(11) Response to Argument

The instant application was remanded to the Examiner by the Board of Patent Appeals and Interferences (hereinafter, the "Remand") on January 27, 2005 to determine:

(1) whether or not Mancusi reasonably discloses or suggests the use of two potting steps ; and

(2) whether or not Mancusi together with Bikson teach or suggest a second potting step involving a mold-potting of the shell and unitized structure as an obvious option to one of ordinary skill in the art (see page 3 of the remand mailed January 27, 2005).

In response, it is noted that Mancusi *et al.* ('832) teach cast-in-place modules and those inserted into a pressure housing (see col. 9, lines 53-56). The manufacturing process of cast-in-place modules includes, inserting a bundle into a housing and, gravitational or centrifugal potting of both bundle ends after sealing the bundle ends with a potting cup clamped over each end of the housing (see col. 9, line 61 through col. 10, line 3). It is noted that cast-in-place modules are intended for low-pressure applications, hence for small modules (less than 4 inches in diameter) (see col. 9, lines 58-60).

The manufacturing process of modules inserted into a pressure housing includes, putting down continuous resinous potting material lines at both bundle ends beginning at the unwound edge of the fabric and forming continuous end seals at both bundle ends extending to the perimeter of the bundle (potting step 1) and, sealing the bundle ends to the housing interior by simply applying an appropriate amount of resinous potting material to the edge adjacent the bundle ends (potting step 2) (see col. 10, lines 41-57). It is noted that Mancusi *et al.* ('832) teach

alternatively (emphasis added) sealing the bundle ends to the housing interior using a ring-shaped fitting designed to tightly rest against the end of the housing interior and adhesively attached to the edge adjacent the bundle (see col. 10, lines 57-60). It is noted that modules inserted into a pressure housing are intended for larger modules (more than four inches in diameter) (see col. 10, lines 27-30) and that the instant application is intended for larger modules (about 10 inches in diameter as shown on page 2, line 9 of the original disclosure). Further, Mancusi *et al.* ('832) teach that gravitational/centrifugal potting cannot be used for large modules because of more potting material is required and as such, more heat is released by exothermic reaction resulting in heat damage (see col. 10, lines 27-40), whereas the instant application is trying to solve the same sealing problem for large modules.

In response to Appelants' arguments against the teachings of Mancusi *et al.* ('832), Bikson *et al.* ('019), Huang *et al.* ('584) and Caskey *et al.* ('760) individually (see pages 9-14 of the Appeal brief filed January 30, 2004), it is noted that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Regarding Appellants' first issue, Appellants argue that there is no suggestion to combine the teachings of Mancusi *et al.* ('832) and Bikson *et al.* ('019) because "Mancusi fails to teach or suggest anything about employing a two potting steps method...to form a seal between the tube sheets and the shell"...because "the creation of seal between the tube sheets to the interior of the housing in Mancusi is facilitated via the use of O-rings" (see pages 16-17 of the Appeal brief

filed January 30, 2004 and paragraphs 5-10 of the Declaration filed by Charles J. Runkle on December 23, 2002 (hereinafter, the "Declaration")).

In response, it is first noted that the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). Further, it is noted that throughout prosecution of the instant application, it has been shown that Mancusi *et al.* ('832) specifically teach providing a core, wrapping a hollow fiber fabric onto said core (winding), potting the fabric and the core together by putting down continuous resinous potting material lines (bead-potting) to form an assembly (first potting), placing the assembly in a housing (shell) and potting the assembly and the housing interior to form a cartridge (second potting) by potting of the tube-sheets to the interior of the housing (see col. 8, lines 44-48 and, col. 9, lines 1-7, 22-27, 41-60 and 60-68).

Regarding the second potting step, Mancusi *et al.* ('832) specifically teach that for large modules (larger than four inches in diameter), the "bundle ends can be *sealed to the housing interior* as needed, by simply *applying an appropriate amount of resinous potting material* to the edge adjacent the bundle ends" and that *alternatively* a ring shaped fitting may be used (emphasis added) (see col. 10, lines 41-57). Hence, Mancusi *et al.* ('832) clearly teach the use of O-rings as an *alternative* to resin potting (emphasis added) and as such, it is submitted that

Mancusi *et al.* ('832) specifically teach potting of the tube-sheets to the interior of the housing as a second potting step.

Further regarding Appelants' first issue, Appelants argue that "the proposed combinations would change the principle of operation of Mancusi" because "Mancusi...employs the use of O-rings to form the seal while the instant invention employs a two potting steps method to form a seal" and as such "substitution of a two potting steps method as the means for forming the seal for O-rings would substantially change the principle operation of Mancusi" (see pages 18-19 of the Appeal Brief filed January 30, 2004 and paragraphs 5-10 of the Declaration). However, it is noted that in col. 10, lines 50-60, Mancusi *et al.* ('832) specifically teach that the "bundle ends can be *sealed to the housing interior* as needed, by simply *applying an appropriate amount of resinous potting material* to the edge adjacent the bundle ends" and that *alternatively* a ring shaped fitting may be used (emphasis added). Hence, it is submitted that Mancusi *et al.* ('832) specifically teach potting of the tube-sheets to the interior of the housing (second potting) as an *alternative* (emphasis added) to an O-ring seal and as such, the principle of operation of Mancusi *et al.* ('832) is not substantially changed as Appellants argue because, Mancusi *et al.* ('832) specifically teach a second potting step.

Further regarding Appelants' first issue, Appelants argue that the heat treatment of Bikson *et al.* ('019) occurs "after the first potting step in order to densify the walls of the hollow fibers, and to enlarge the diameter of the lumen of that portion of hollow fibers embedded in potting materials" whereas in the instant invention the heat treatment step is "a subsequent step to the two potting steps in order to strengthen the seal between the tube sheets and the shell" (see

page 19 of the Appeal Brief filed January 30, 2004). In response, it is noted that the step of heat treating the cartridge is claimed as a further step using the transitional language of "comprising." Under MPEP §2111.03, the "transitional term 'comprising', which is synonymous with 'including,' 'containing,' or 'characterized by,' is inclusive or open-ended and does not exclude additional, unrecited elements or method steps. See, e.g., Genentech, Inc. v. Chiron Corp., 112 F.3d 495, 501, 42 USPQ2d 1608, 1613 (Fed. Cir. 1997). As such, it is submitted that the claimed invention is not limited to a heat treatment step that is a subsequent step to the two potting steps. Further, it is noted that under MPEP §2144, it "is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by applicant. In re Linter, 458 F.2d 1013, 173 USPQ 560 (CCPA 1972). Further, MPEP §2144 specifies that "there is no requirement that the prior art provide the same reason as the applicant to make the claimed invention." Hence, it is submitted that under MPEP §2144, it is not necessary for Bikson *et al.* ('019) to teach a step of heat treatment for the same reason as Appellants do in the instant invention. Furthermore, it is noted that the features upon which applicant relies (i.e., a subsequent step to the two potting steps in order to strengthen the seal between the tube sheets and the shell) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Regarding Appellants 2nd and 4th - 8th issues, Appellants argue that "if an independent claims is nonobvious...then any claim dependent therefrom is nonobvious" (see pages 20 and 24-27 of the Appeal Brief filed January 30, 2004). As such, it is submitted that the response

provided for Appelants' 1st issue is also applicable in regard to the 2nd and 4th - 8th issues raised by Appellants.

In regard to Appellants' 3rd issue, Appellants argue that "there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify *Huang*'s teachings or to combine *Huang*'s teachings with the teachings of *Mancusi* and *Bikson*" (see pages 20-21 of the Appeal Brief filed January 30, 2004 and paragraphs 5-10 of the Declaration). In response, it is first noted that the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). Further, it is noted that throughout prosecution of the instant application, it has been shown that Huang *et al.* ('584) teach a process for making a hollow fiber membrane separation device (contactor) including, providing a core, wrapping a hollow fiber fabric onto said core and potting the fabric and the core together to form an assembly (see col. 15, line 57 through col. 16, line 26). Further, Huang *et al.* ('584) teach bead-potting (see Figure 1). Mancusi *et al.* ('832) teach a process for making a hollow fiber membrane separation device (contactor) including, providing a core, wrapping a hollow fiber fabric onto said core, potting the fabric and the core together to form an assembly, placing the assembly in a housing (shell) and potting the assembly and the housing interior to form a cartridge (see col. 8, lines 44-48, col. 9, lines 1-7 and 60-68 and col. 9, lines 41-60).

Further, it should be noted that Mancusi *et al.* ('832) specifically *teach potting of the tubesheets to the interior of the housing* (see col. 9, lines 22-27) (emphasis added). Bikson *et al.* ('019) teach a process for forming a hollow fiber membrane contactor cartridge including, providing a mold, inserting the ends of a plurality of hollow fiber (3) bundles into the mold and injecting a resinous material into the mold to form tube-sheets (1) that are integral with the housing (see col. 4, lines 48-68). Therefore, it would have been obvious for one of ordinary skill to have inserted a hollow fiber membrane device into a casing and to pot said hollow fiber membrane device to said casing as taught by Mancusi *et al.* ('832) in the process of Huang *et al.* ('584) because, Huang *et al.* ('584) specifically teach a hollow fiber membrane fabric used in separation devices, whereas Mancusi *et al.* ('832) teach a hollow fiber membrane separation devices having a hollow fiber membrane fabric and a casing and as such, the hollow fiber membrane fabric of Huang *et al.* ('584) requires to be inserted into a casing and potted to said casing as taught by Mancusi *et al.* ('832) in order to function as described. Further, it would have been obvious for one of ordinary skill in the art to have used mold potting as an alternative to gravity or centrifugal potting as taught by Bikson *et al.* ('019) in the process of Huang *et al.* ('584) in view of Mancusi *et al.* ('832) because, Bikson *et al.* ('019) teach that mold potting is one of many equivalent procedures available to one ordinarily skilled in the art and also because, all references teach similar products and processes and solve the similar problem of potting in a process of making a hollow fiber membrane separation device (contactor). It is submitted that a space must exist between exterior of the fiber bundles and, the mold and the housing, in order for the resin to

penetrate between said space such that mold potting occurs as described in the process of Huang *et al.* ('584) in view of Mancusi *et al.* ('832) and in further view of Bikson *et al.* ('019).

Further regarding Appellants' 3rd issue, Appellants argue that "Bickson only discloses mold potting in connection with forming tube sheets" and that there "is no mention in *Bikson* about employing a two potting steps method...to form a seal between the tube sheets and the shell" (see page 22 of the Appeal Brief filed January 30, 2004). In response, it is noted that throughout prosecution of the instant application the teachings of Bikson *et al.* ('019) were used to show a process for forming a hollow fiber membrane contactor cartridge including, providing a mold, inserting the ends of a plurality of hollow fiber (3) bundles into the mold and injecting a resinous material into the mold to form tube-sheets (1) that are integral with the housing (see col. 4, lines 48-68). Further, it is noted that it is Mancusi *et al.* ('832) that specifically teach that the "bundle ends can be *sealed to the housing interior* as needed, by simply *applying an appropriate amount of resinous potting material* to the edge adjacent the bundle ends" (second potting). It is noted that Mancusi *et al.* ('832) clearly teach the use of O-rings as an *alternative* to resin potting (emphasis added) and as such, it is submitted that Mancusi *et al.* ('832) specifically teach potting of the tube-sheets to the interior of the housing as a second potting step. Furthermore, it is note that Bikson *et al.* ('019) teach that mold potting is one of many equivalent procedures available to one ordinarily skilled in the art (see col. 4, lines 50-55).

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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